

34. NEW TAXA OF *ANABAENA* BORY — THE BLUE GREEN
ALGAE FROM PADDY FIELDS OF KARNATAKA STATE
(INDIA)

(With three text-figures)

INTRODUCTION

Among a number of interesting algae recorded during our studies on the algal flora of crop fields, those belonging to *Anabaena* Bory of Nostocaceae: Nostocales: Cyanophyta (Desikachary 1959) are included in the present communication. Algae recorded in enrichment cultures of soil samples were further studied by isolating in soil-water biphasic media (Singh 1961).

1. *Anabaena oscillatoroides* Bory ex Born. et Flah. var. *attenuata* var. nov. (Fig. 1).

Thallus microscopic; trichomes short, slightly attenuated at ends; cells 3.0-3.5 μm broad, barrel shaped; end cell obtuse conical; heterocysts subspherical to compressed, 5.0-5.5 μm broad; spores cylindrical with rounded ends, 8-9 μm broad, 17-26 μm long.

Habitat: Paddy field soil at Mutnal in Belgaum district, Karnataka State.

Type specimen: Deposited (KUDB-76/42) at the Algal Laboratory, Karnatak University, Dharwad.

Anabaena oscillatoroides Bory ex Born. et Flah. var. *attenuata* var. nov. (Fig. 1)

Thallus microscopic; trichomata brevia, in extremitatibus paululum attenuata; cellulae 3.0-3.5 μm lata, doliformes; cellula terminalis obtuse conica; heterocystes subsphaericae ad compressas, 5.0-5.5 μm lata; sporae cylindricae, extremitatibus rotundatis, 8-9 μm lata, 17-26 μm long.

Habitatio: in soli ex agro Oryzae ad locum Mutnal in Belgaum district of Karnataka State dictum relata.

Typus speciminis: in laboratorio pro Algis,

Universitatis Karnatak, Dharwad (KUDB-76/42) depositus.

Differs from the type in the heterocysts being not oval and being smaller, and trichomes attenuated at the ends and smaller (Geitler 1932, p. 886, fig. 567; Desikachary 1959, p. 417, pl. 71, fig. 7).

Anabaena rivularioides sp. nov. (Fig. 2)

Thallus super superficiem soli patens; trichomata perlonga, diverse flexa, 3.5-4.0 μm lata, in vagina non inclusa; cellulae doliformes, circa $1\frac{1}{2}$ plo longiores quam latae; proprie ad locos incrementi in partes longas capillares attenuatae et denique ad heterocystes se fragentes; heterocystes intercalares ovales ad ellipsoideas ad sub-quadratas, 6-7 μm lata, usque ad 10 μm long., heterocystes terminales subsphaericae ad sub-conicas, paulo minores quam cellulae vegetativae; sporae ellipsoideae, iuxta heterocystes intercalares et uno in latere, 5.0-6.5 μm lata, 7-8 μm long., epispora levis.

Habitatio: in soli ex agro Oryzae ad locum Mutnal in Belgaum district of Karnataka State dictum relata.

Typus speciminis: in laboratorio pro Algis, Universitatis Karnatak, Dharwad (KUDB-76/30) depositus.

2. *Anabaena rivularioides* sp. nov. (Fig. 2)

Thallus spreading on soil surface; trichomes very long, variously bent, 3.5-4.0 μm broad, not enclosed in a sheath; cells barrel shaped, about $1\frac{1}{2}$ times longer than broad, characteristically attenuated into long hair like portions at growing points and finally breaking at heterocysts; intercalary heterocysts oval to ellipsoidal to sub-quadrata, 6-7 μm broad, upto 10 μm long; terminal heterocysts subspherical to sub-conical, slightly smaller than vegetative cells;

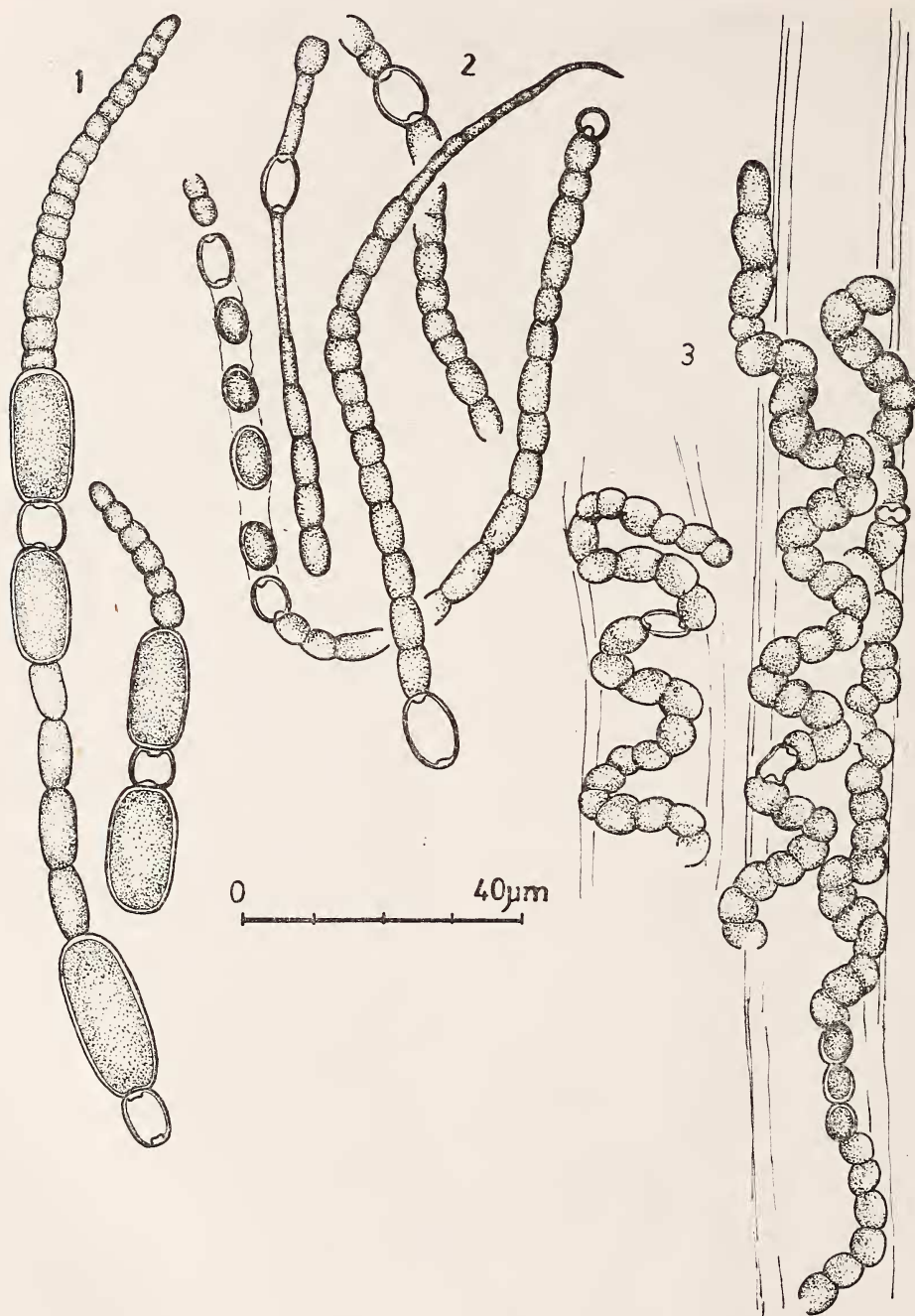


Fig. 1. *Anabaena oscillatoroides* Bory ex Born. et Flah. var. *attenuata* var. nov.

Fig. 2. *A. rivularioides* sp. nov.

Fig. 3. *A. spiroides* Klebahn var. *epiphytica* var. nov.

spores ellipsoidal, next to and on one side of intercalary heterocysts, 5.0-6.5 μm broad, 7-8 μm long, epispore smooth.

Habitat: Paddy field soil at Mutnal in Belgaum district of Karnataka State.

Type specimen: Deposited (KUDB-76/30) at the Algal Laboratory, Karnatak University, Dharwad.

The alga can be compared with *Anabaena aphanizomenoides* Forti, in the shape and size of vegetative cells and heterocysts (Geitler 1932, p. 875, fig. 556; Desikachary 1959, p. 405, pl. 71, fig. 4); but differs from in having terminal unipored heterocysts, smaller size of akinetes and in trichomes being occasionally tapering and breaking adjacent to the intercalary heterocysts giving an appearance of the filaments of *Rivularia* (Roth.) Ag. (!). In view of these distinctive characters, the present form is separated as a new species, the name being suggestive of its resemblance to *Rivularia*.

***Anabaena spiroides* Klebahn. var. *epiphytica* var. nov. (Fig. 3):**

Trichomata 2-3 crescentia super vaginas vacuas mucilaginasque probiliter *Lyngbya* Ag., regulariter torsiva maximam partem, et erecta spatium breve in extremitate; spirae 15-20 μm latae, 9-22 μm distantes; cellulae 3-6 μm latae, cupiformes, usque ad 2-plo longiores quam latiores; cellula terminalis obtusa; heterocystae rarae, cylindricae depressaeque, 3.0-3.5 μm latae, 5-6 μm longae; sporae (iuvenes?) rarae, procul ab heterocystis, breves ellipsoideaeque, 4.0-4.5 μm latae, usque ad 5.5 μm longae, epispodium laeve.

Habitatio: in soli ex agro Oryzae, Halyal, in

regione Kanara septentrionali, Karnataka.

Typus specimenis: in laboratorio pro Algis, Universitatis Karnatak, Dharwad (KUDB-76/88) depositus.

3. ***Anabaena spiroides* Klebahn. var. *epiphytica* var. nov. (Fig. 3)**

Trichomes 2 to 3 together growing over empty mucilaginous sheaths probably of *Lyngbya* Ag. regularly spirally coiled for the major part and terminally erect for a short distance, spirals 15-20 μm broad and 9-22 μm distant; cells 3-6 μm broad, short barrel shaped to twice as long as broad; end cell obtuse; heterocysts rare, compressed cylindrical, 3.0-3.5 μm broad, 5-6 μm long, spores (young?) rarely found, away from the heterocysts, short ellipsoidal, 4.0-4.5 μm broad, upto 5.5 μm long, epispore smooth.

Habitat: Paddy field soil at Halyal in North Kanara district, Karnataka State.

Type specimen: Deposited (KUDB-76/88) at the Algal Laboratory, Karnatak University, Dharwad.

Differs from the type in trichomes being not single and free floating, spirals being more compact, heterocysts being not sub-spherical and spores not spherical (Geitler 1932, p. 881; Desikachary 1959, p. 395, pl. 71, fig. 9).

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35. VARIABILITY IN *BALANITES ROXBURGHII* PL. IN THE INDIAN DESERT

INTRODUCTION

Morphological variability in fruit and seed has some adaptive value for plants in different habitats. Polymorphism is an adaptive trait in arid environment which is characterised by extremes of temperature, low erratic and variable rainfall, high evaporation rates and different soil types. Such variable stress conditions and gene exchange through cross pollination have generated more variability. This desert region is also a centre of diversity/origin of crops like *Vigna acontifolia*, *Cyanopsis tetragonoloba*, *Zizyphus mauritiana* and *Carissa congesta* (Singh *et al.* 1963).

Balanites aegyptiaca Del. is thought to have originated in Nile valley, but is now widely distributed in Africa and Asia (Davis *et al.* 1983). The Indian plant *B. roxburghii* Pl. has a wide ecological amplitude and is common all over western Rajasthan except in the extreme north western part of the state where the annual rainfall is below 200 mm. Its fruits are a source of diosgenin, a precursor for the synthesis of sex hormones, cortico-steroid drugs, anabolic agents and anti-fertility compounds. The seeds contain about 45% oil and seed meal with high amount of protein. The study of the ecological distribution of the plant in western Rajasthan has led to the collection and identification of 50 types from ten sites located in four districts. The type was based on the fruit shape and size. The leaves were

also collected to find if correlation exists between shape/size of fruit and leaf.

MATERIAL AND METHODS

An exhaustive survey was conducted in the districts of Sirohi, Pali, Jodhpur, Barmer and Jaisalmer, to collect fruit and leaf material from *Balanites* trees. At least 20 fruits and leaves were collected from each tree. Observations were recorded on fruit weight, length, width, circumference, volume, weight, length, width of stone and seed (after removal of pulp and endocarp) and leaflet length and breadth. The mean, standard deviation and coefficient of variation values were estimated for each character observed. Correlation analysis was done for length, breadth, size index and shape index characters of fruit and leaflet. Length \times breadth gave size index while length divided by breadth gave shape index.

RESULTS AND DISCUSSION

Among an exhaustive collection of fruits from several sites, at least fifty types have been identified based on fruit characters. A great amount of variability with respect to fruit length, width, circumference, weight, volume and diosgenin content existed (Table 1). The size and shape of the stone and seed resembled to that of the fruit. The size and shape of the leaflets of the fifty types also